



Zootaxa 3830 (1): 001–089
www.mapress.com/zootaxa/

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Monograph

ISSN 1175-5326 (print edition)

ZOOTAXA

ISSN 1175-5334 (online edition)

<http://dx.doi.org/10.11646/zootaxa.3830.1.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:D1B92849-3D00-4C27-809E-15A3B50ECF19>

ZOOTAXA

3830

The bumblebees of North China (Apidae, *Bombus* Latreille)

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Magnolia Press
Auckland, New Zealand

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The bumblebees of North China (Apidae, *Bombus* Latreille)

(*Zootaxa* 3830)

89 pp.; 30 cm.

8 Jul. 2014

ISBN 978-1-77557-439-2 (paperback)

ISBN 978-1-77557-440-8 (Online edition)

FIRST PUBLISHED IN 2014 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

<http://www.mapress.com/zootaxa/>

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ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

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Abstract

Bumblebees are important pollinators for wild flowers and agricultural crops. North China is a region of varied geomorphology and vegetation, with plateaus, plains, mountains and deserts, and is part of the greatest hotspot of bumblebee diversity worldwide. We report on a field survey of the bumblebees of North China made between 2005–2012. A sample of 21,636 bumblebee specimens are assigned to 76 species. One older specimen held in London added one more species to this list. Together, these 77 species represent 10 subgenera of the genus *Bombus*. Seven species are recorded from North China for the first time: *B. (St.) distinguendus*, *B. (Th.) anachoreta*, *B. (Th.) pseudobaicalensis*, *B. (Th.) exil*, *B. (Ps.) campestris*, *B. (Pr.) infirmus* and *B. (Ag.) validus*. We provide identification keys for both males and females, photographs of the common colour patterns, and distribution maps for all species. We describe variation in local species richness and abundance, and list the food plants used by bumblebees in North China. The most abundant 10 bumblebee species are: *B. (Ml.) pyrosoma*, *B. (Bo.) lantschouensis*, *B. (Bo.) patagiatus*, *B. (St.) melanurus*, *B. (Sb.) sibiricus*, *B. (Bo.) ignitus*, *B. (Th.) hedinii*, *B. (Pr.) picipes*, *B. (Mg.) trifasciatus* and *B. (Mg.) longipes*. Bumblebees are distributed widely within North China, from low elevations near the edge of the North-China plain to high elevations at the edge of the east Qinghai-Tibetan plateau (65–4011 m). The highest species richness is found in meadows of the high elevation east Qinghai-Tibetan plateau and in forests of the Qilianshan mountains in southwestern Gansu. The 337 food plant species recorded here belong to 49 families, showing that bumblebees play an important role in interconnecting agricultural and natural ecosystems in North China.

Key words: fauna, biogeography, distribution, richness, abundance, pollinator, food plants, key to species

Europe for pollination of greenhouse crops since 1996 (especially for winter crops in northern China), even though this species is not native (except in the far northwest of China). So far this species has not been found surviving in the field in the east. But because China is the richest country for bumblebee species world-wide, and because pollination by other native and possibly sensitive bumblebee species plays such a vital role in natural and agricultural ecosystems, it would be unwise to see *B. terrestris* (even the native western bees) introduced into east China. Measures regulating importation or the movement between regions of any bumblebee species in China should be made in advance to prevent decline of native. Otherwise, devastating losses of native bees and reductions in pollination services could occur in China. At the same time, conservation and utilization strategies for native bumblebees should be prioritized, in order to improve pollination for agricultural production and to maintain natural ecosystems.

Acknowledgements

This work was supported financially by the International Cooperation and Exchange Program between the Natural Science Foundation of China and the Royal Society UK (31211130110); the Special Fund for Agro-scientific Research in the Public Interest (201203080); the National 948 Project (2011-S1); the China Agriculture Research System (CARS-45); the Fundamental Research Funds for the Central Institutes (09NM-01); and the Natural Science Foundation of China (30471316, 30901055). We thank Jie Dong for sequencing COI barcodes for the difficult species in this study; Jian Yao for checking bees in the IZB collection; Dr Gangmin Zhang and Dr Lei Meng for the identification of the bumblebee food plants; Longlong Xu and Hong Zhang for improving some of the figures; Dr Shudong Luo, Dr Jilian Li, Zhanbao Guo, Yuemin Tong, Jun Guo, Dr Qihua Luo, Haiyan Shi, Yazhou Zhao, Wenfeng Chen, Haoran Qin, Zhiyong Zhou, Longlong Xu, Jie Dong, Mingming Wang, Xiuli Liao, Lijiao Gao, Hong Zhang, Ping Liu, Zhengying Miao, Aiping Han, Wenzhong Qi, Guiqian Zhang, Jingping Xi, Guowei Zhao, Shouli Liu, Shisheng Cao, Yaning Zhang, Xiaopeng Liu, Zhongqiao Chu, Yi Du, and Wenjie Sun for help in surveying bumblebees, and Dr Murat Aytekin and Prof. Pierre Rasmont for their helpful comments on the manuscript.

Author Contributions

JA, planning and execution of the surveys, data analysis, preparation of the manuscript; JH, surveys and preliminary identification of bees, data analysis; YS, SZ, BW, XL, regional coordinators and bee surveys; JW, supervision of project; PW, identification/confirmation of bees, preparation of manuscript, writing identification keys.

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